THERMOPOL

OPERATIONAL MANUAL

Manual No.: M-30TR-OM1

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M-30TR SYSTEM

SOLID STATE REFRIGERATOR
BIOMEDICAL, DRUGS AND WHOLE BLOOD

REFRIGERATOR M-30TR (P.N. A-7244)

POWER SUPPLY (P.N. A-7160)

BASKET ASSEMBLY (P.N. A-2420)

POWER CABLE ASSEMBLY (P.N. A-2089)

BATTERY PACK ASSEMBLY (P.N. A-2321)

NSN # 4110-01-451-2356 **NATO # 4310-99-770-7126**

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Section 1

M-30TR Description and Operation

1-0. Unpacking the M-30TR

1. Inspect shipping box immediately for evidence of damage.
2. Stand the carton upright. (Note arrows)
3. Cut the plastic packing bands.
4. Pull up all top cover's flaps of shipping container.
5. Pulling from the top, lift the M-30TR out of shipping box.
6. Open unit, and remove all inside contents.
7. Verify contents to include:

    1 - Power Supply (P.N. A-7160)
    2 - Maintenance Manuals (P.N. M-30TR-MM1)
    2 - Operational Manuals (P.N. M-30TR-OP1)
    1 - Wire Basket (P.N. A-2420)
    1 - DC Power Cable (P.N. A-2089)
    1 - Battery Pack (P.N. A-2321)
    50- Temperature Charts (P.N. P-2415-C)

8. Inspect contents immediately for damage.

If the unit or contents are defective or damaged, contact factory within 24 hours.

Phone: (312) 666-9966
Fax: (312) 666-9977

or notify in writing to:

Thermopol Inc.
1550 West Carroll Avenue
Chicago, IL 60607-1012

1-1. System Familiarization

The M-30TR is a solid state refrigerator/heater unit designed to keep the contents of the load compartment between 35.6°F (2°C) to 42.8°F (6°C), over the operational ambient range.

The unit does not require fans, motors, gas, or air pressure. Cooling is performed by thermoelectric technology.

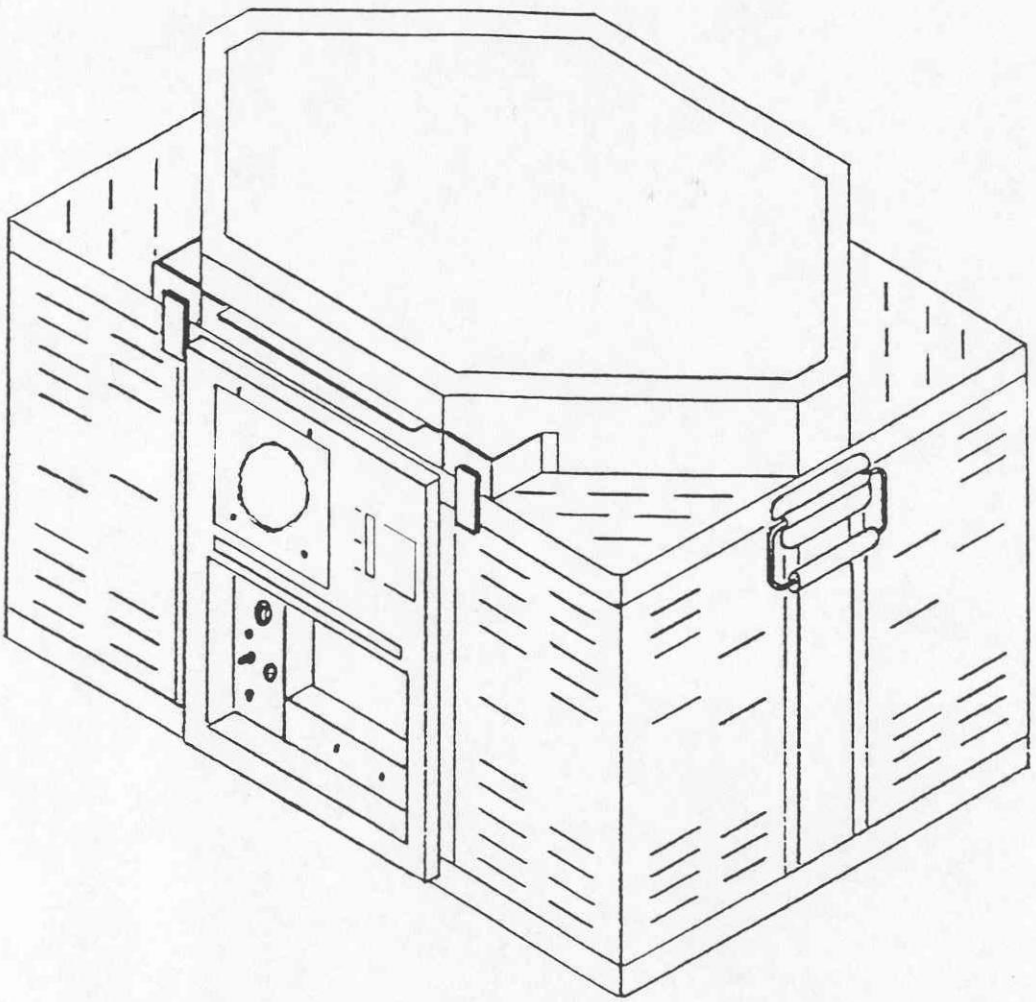

Figure 1
M-30TR Blood Transportation Refrigerator

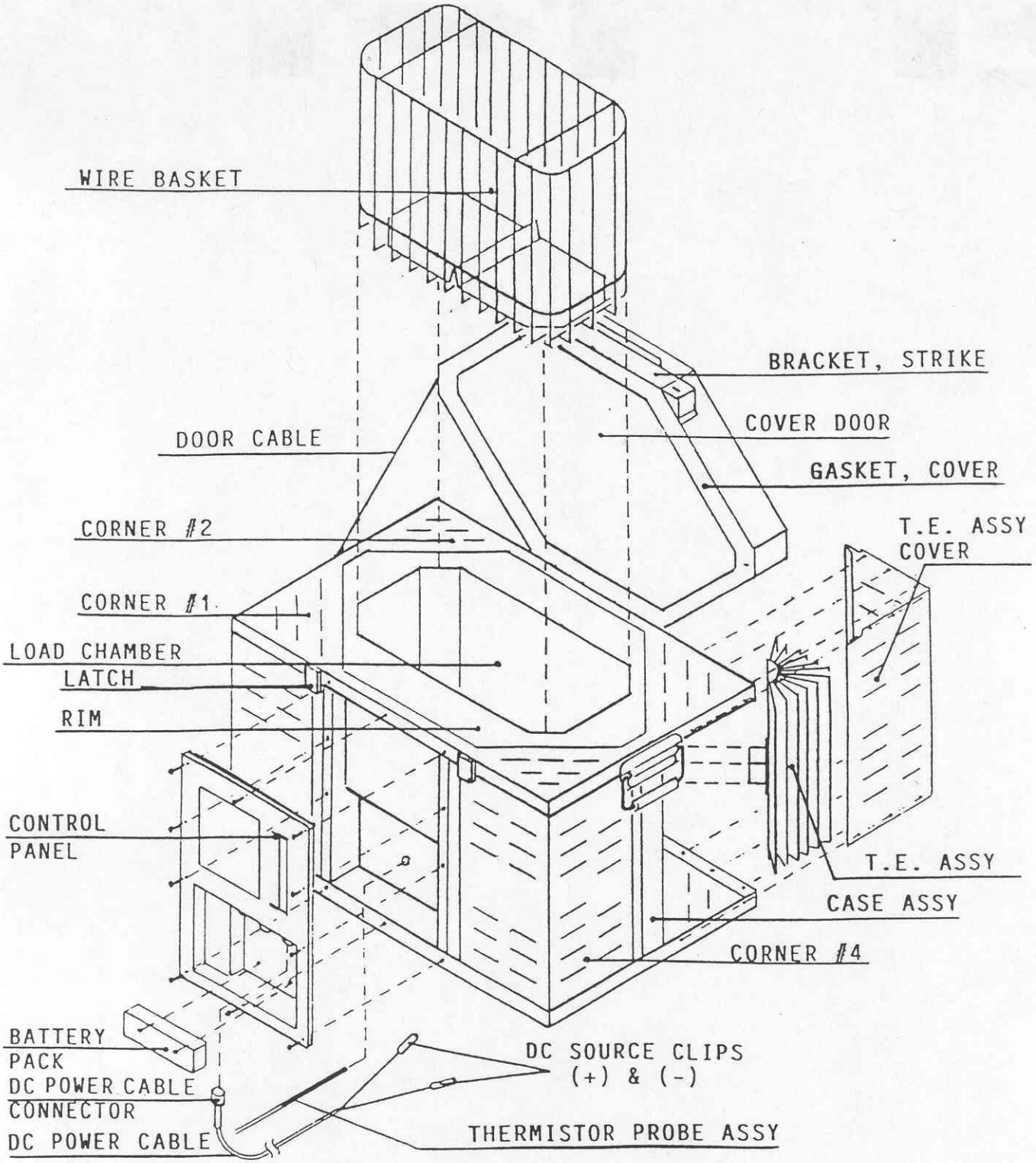

Figure 2
M-30TR Exploded Front View

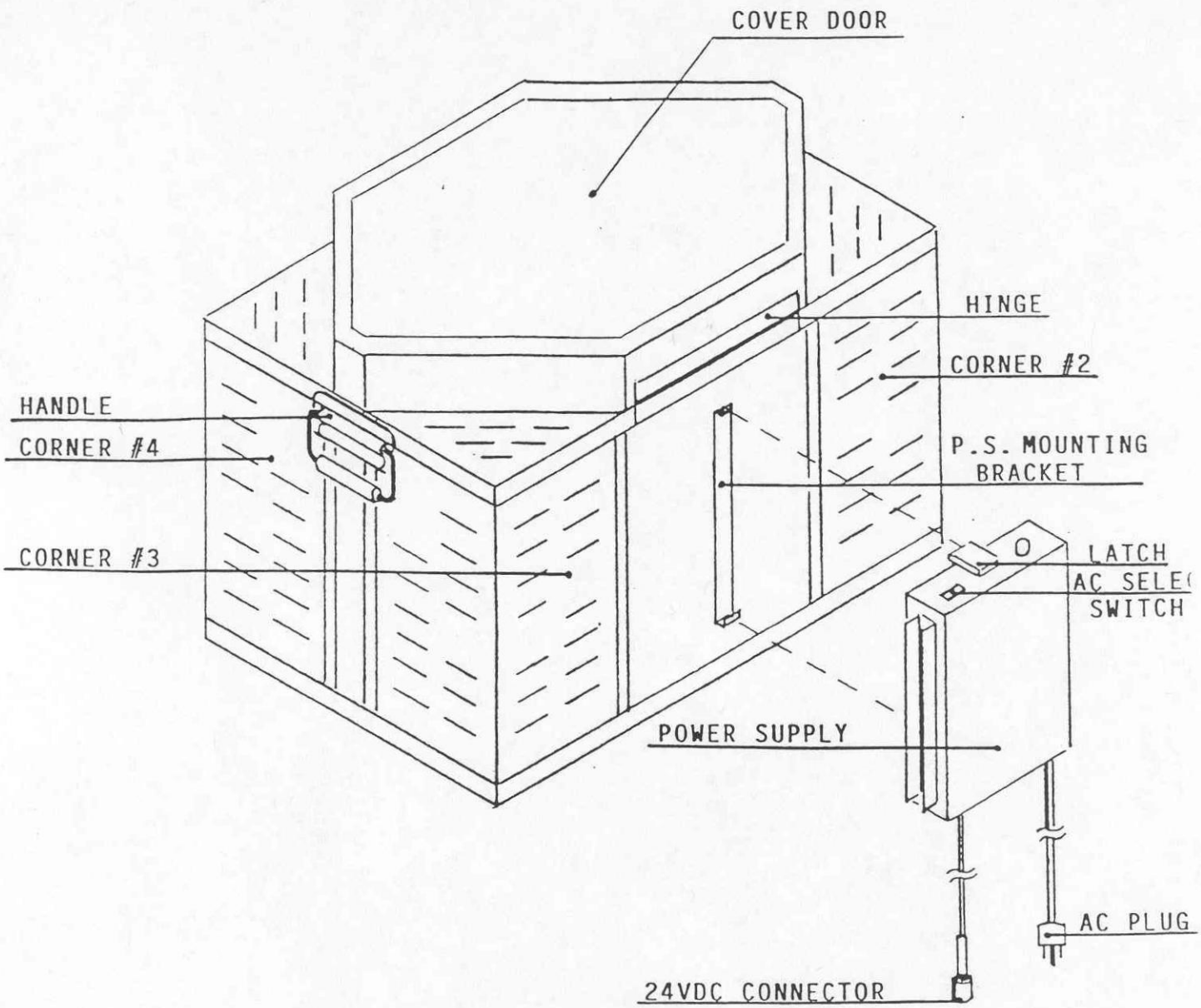

Figure 3
M-30TR Exploded Rear View

1-2. Description and Specifications

The unit is a modified commercial blood and vaccine transportation unit designed for operation in harsh environments.

The M-30TR operates on 12VDC or 24-28VDC and can be plugged into a 115VAC or 230VAC main, through a rectifier power supply. The power supply can be mounted on the unit. The M-30TR inner capacity is approximately 1^3 foot and can accommodate 40 blood bags of 450ml.

M-30TR SPECIFICATIONS

Electrical Specifications for the M-30TR are listed below:

Voltage	Current
12VDC Nominal	7 Amps Max.
24/28VDC Nominal	3.5 Amps Max.
115VAC, 50Hz	1.6 Amps Max.
115VAC, 60Hz	1.6 Amps Max.
230VAC, 50Hz	0.8 Amps Max.
230VAC, 60Hz	0.8 Amps Max.

Physical Dimensions:

	Outside	Inside
Width:	66 cm (26 in)	43 cm (16.9 in)
Depth:	48.9 cm (19.3 in)	21.6 cm (8.5 in)
Height:	47cm (18.5 in)	30 cm (11.8 in)
Volume:	0.15^3 Meter (5.4^3 Ft)	28 Liter (1^3 Ft)
Weight:	31 kg (68 lbs.)	

SECTION 2
OPERATION

2-0 General

The following information should be used to assist in the prompt set-up of the M-30TR Blood and Vaccine Refrigerator. These directions for unpacking and installation will considerably ease initial set-up, and avoid unnecessary mistakes.

2-1 Proper Location of Equipment

The M-30TR is designed to operate at ambient temperatures of between -40°C (-40°F) through 49°C (120°F) as per Climatic Criteria AR 70-38; QSTAG 360.

The unit should be operated or stored in a normally ventilated area that meets AR 70-38; QSTAG 360.

2-2 Assembly Interconnections

The battery pack (P-2321) should be mounted directly to the control panel. The two slotted screws of the battery pack should be securely fastened. When in storage, loosen the two slotted screws to disconnect the battery pack. See Page 6 Figure 2.

For AC operation, the power supply (A-7160) can be mounted on the rear mounting bracket of the M-30TR Blood and Vaccine Refrigerator. It should then be connected to the 24/28VDC plug, located on the control panel (Page 11 Figure 4). The AC cable should be plugged into the correct AC main.

For DC operation, use the power cable (A-2089) supplied with the M-30TR. Connect the cable between the DC source and the corresponding receptacle located in the control panel (Page 11 Figure 4).

Note: When properly connected, the green power indicator light (Page 11 Fig.4) should be on. No switching is needed.

The unit is factory set for 115VAC operation. Should the unit be operated in other than 115VAC locations, replace the AC main plug with the correct hospital grade plug.

M-30TR Control Panel Function Description

Item	Function/Description
1	**THERMOMETER.** Color-coded display of compartment temperature.
2	**NAME PLATE.** Identifies the make, model, serial number and NSN. Provides labeling medium for voltage receptacles.
3	**AUDIO ALARM SIGNAL.** Beeps when alarm is activated.
4	**VISUAL ALARM SIGNAL.** Blinks red when alarm is activated.
5	**CIRCUIT BREAKER.** Provides overcurrent protection, push to reset.
6	**ALARM TEST/RESET SWITCH.** Push up for testing, push down for resetting.
7	**POWER INDICATOR.** Lights green when unit is properly powered.
8	**RECORDER.** Hard copy temperature recorder operates at 1 turn per week.
9	**BATTERY PACK.** Standby power for recorder, thermometer and alarm during power failure. (Continuously recharging NiCd 7.2VDC).
10	**24/28VDC POWER RECEPTACLE.** Connects a 24/28VDC power source through power cable (P.N. A-2089). Alternatively, connects to power supply (P.N. A-7160).
11	**12VDC POWER RECEPTACLE.** Connects a 12VDC power source through power cable (P.N. A-2089).

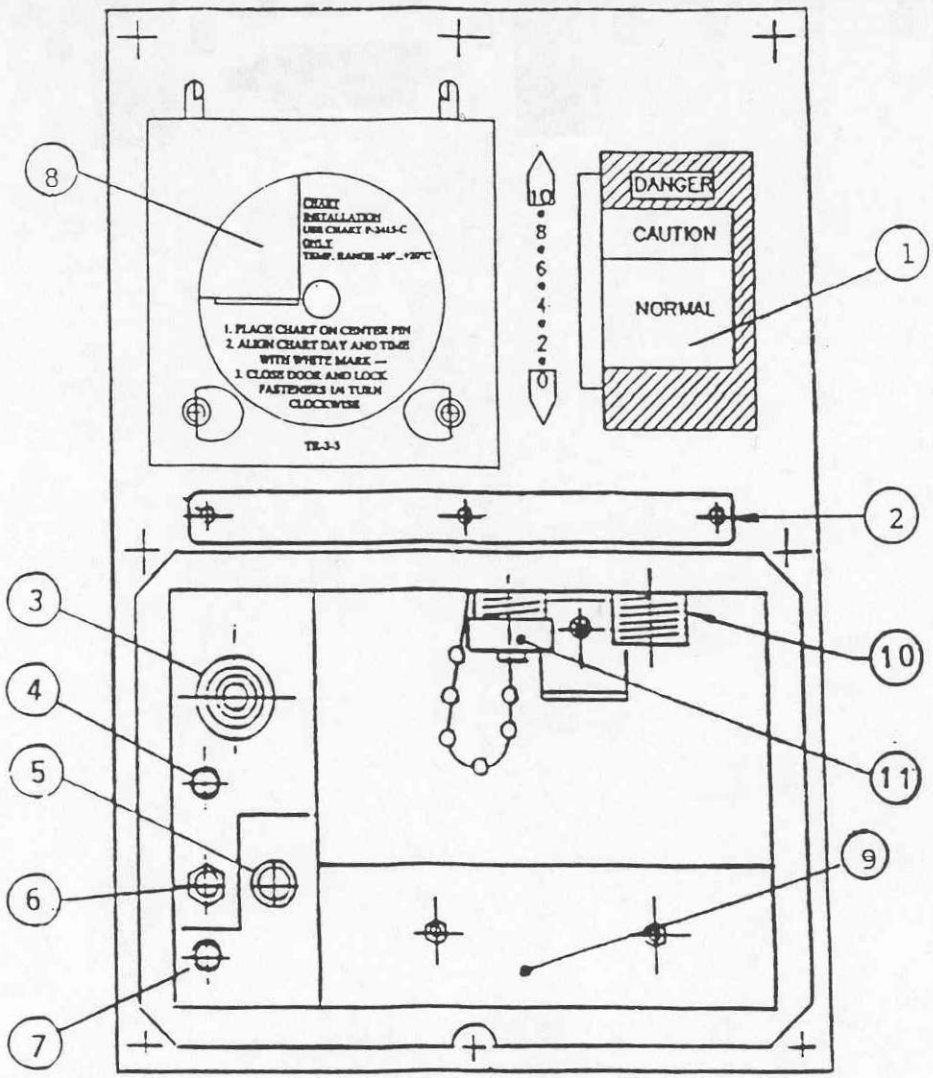

Figure 4
Control Panel
Features and Controls

1. Thermometer
2. Name Plate
3. Audio Alarm
4. Visual Alarm Light
5. Protective Circuit Breaker
6. Alarm Test/Reset Switch
7. Power Indicator Light
8. Recorder
9. Battery Pack
10. 24/28 VDC Receptacle
11. 12 VDC Receptacle

2-3 Initial Adjustments

The M-30TR is factory set for normal operation. No initial adjustments are necessary.

The power supply is factory set to 115VAC. If used at a 230VAC location, the power supply must be set to the local voltage. To set AC voltage, use a Flathead screwdriver and move the slide AC select switch to the 230VAC position, as indicated on the top side of the power supply.

2-4 Starting, Operating, and Stopping the Equipment

To start the operation of the M-30TR, the unit must be connected to an appropriate power source. Once the unit has been properly connected, the green power indicator light will be on. No switching is necessary.
Steps for starting the unit in operation:

1. Source Voltage Determination
   Ascertain available power source voltage: 115VAC, 230VAC, 12VDC, 24-28VDC.

2. Connection to the Unit
   Connect in accordance with the source voltage:

Source	Connection	Receptacle
12VDC	Power Cable A-2089	J2-12VDC
24/28VDC	Power Cable A-2089	J1-24VDC
115VAC or 230VAC	Power Supply Plug	J1-24VDC

3. Installation of Battery Pack

Install a charged battery pack in the control panel recess. The indicator of the compartment thermometer will light. If the battery voltage is low, the battery pack will charge automatically when power is provided to the M-30TR unit. To verify the performance of the battery pack, disconnect the M-30TR after approximately 15 minutes and observe the light on the thermometer, indicating proper operation of the battery pack. For location, see Page 6 Figure 2.
Note: The alarm will operate with or without the battery pack when power is provided to the M-30TR unit.

4. Alarm/Battery System Test

Push the lever of the alarm switch (Page 11 Figure 4), on the control panel, up to the test position. The thermometer indicators will light. The alarm red light (Page 11 Figure 4) will blink and sound signal will beep.

Push the lever of the alarm switch down to the reset position. The alarm mode will be off.

5. Connection to Source

For 12VDC or 24/28VDC, the red positive clip of the power cable must be connected to the positive (+) contact of the source, and the black negative clip, to the negative (-) contact of the source. For AC operation, the power supply is plugged into a main AC outlet.

Note: AC voltage selection

When correctly connected and powered, the green power indicator on the front panel will light, and the M-30TR will be in operation. The compartment temperature will be indicated by the color coded, solid state thermometer changing from red to yellow to green in the normal range.

Note: Remove battery pack when the unit is not in operation

6. Temperature Recording

For hard copy recording, note the shipment date in the center box of the temperature chart P-2415 C. Place the temperature chart on the center hub of the recorder. **DO NOT PUSH THE PAPER DOWN**. Align the day and time with the mark --- on the front panel. Close door and lock with 1/4 turn locks clockwise.

Steps for normal operation

Operation is maintenance free. As long as the unit is properly connected to a correct power source, it will maintain a compartment temperature of 35.6°F (2°C) to 42.8°F (6°C). No adjustments are necessary.

Steps for stopping operation

Stopping the equipment requires unplugging it from its power source. It is advisable to remove the battery pack while unit is not in operation since the alarm will sound once the compartment temperature falls outside the acceptable range.

SECTION 3
POWER SUPPLY

3-0 General

The rectifier power supply is designed specifically to provide the power to operate the M-30TR refrigerator from a 115VAC or 230VAC 50/60Hz in sheltered environments. The input voltage is selectable by the AC selector switch of the power supply.

3-1 Description and Specifications

The power supply is well protected within a closed metal box. Two cables extend from the unit to connect to the main AC source and to the 24/28VDC receptacle of the M-30TR unit

Electrical Specifications:

Voltage	Current
115VAC, 50Hz	1.6 Amps Max.
115VAC, 60Hz	1.6 Amps Max.
230VAC, 50Hz	0.8 Amps Max.
230VAC, 60Hz	0.8 Amps Max.

Weight: 3.7 kg (8 lbs.)

Physical Specifications:

Width	22.4 cm (8.8 in)
Depth	6 cm (2.4 in)
Height	25 cm (9.9 in)
Volume	0.034 cubic meter (0.12 cubic foot)

3-2 Installation

The power supply is mounted on the back of the M-30TR unit (Page 15 Figure 5). When correctly mounted, the latch will be on top, (Page 7 Figure 3).

Insert the power supply slotted spacer plate, located in the bottom of the power supply, into the mounting bracket on the back of the M-30TR unit and fasten the latch located on top of the power supply assembly (Page 15 Figure 5).

Both cables, the main AC power cable and the 24VDC power cable will come out the bottom of the power supply when mounted correctly.
Connect the DC power cable to the 24/28VDC receptacle of the M-30TR (Page 15 Figure 5).
Set the AC voltage selection switch to the correct AC voltage main.

Plug in to operate the unit.

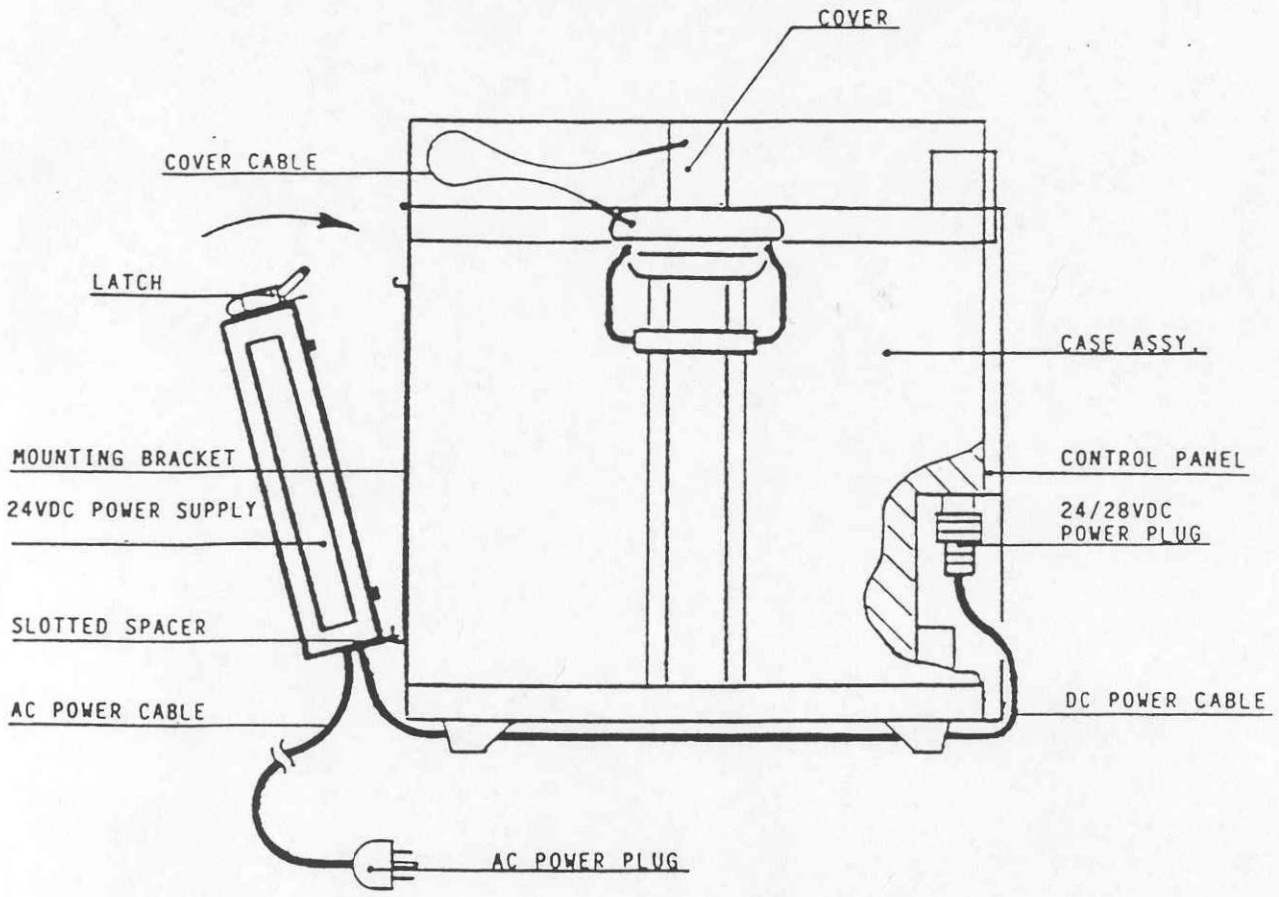

Figure 5
Attaching the Power Supply

Section 4
Hard Copy Recorder

4-0. General

The circular chart recorder is designed to record the load compartment temperature of the Thermopol Refrigerator N.S.N 4110-01-451-2356.

The temperature graph is printed on a hard copy, thermal paper chart P-2415-C by means of periodic heat pulses of the thermal print head. The temperature sensor of the recorder is a built-in integral part of the Thermopol Refrigerator.

Specifically developed for the recorder, the thermal print head is solid state and uses no moving parts.

The recorder chart turns at a rate of 1 turn per week. Measuring range is from -10°C to 20°C.

A microprocessor calculates average compartment temperature through numerous repetitive scans increasing reliability as well as accuracy.

4.1 Activation

Activation is automatically achieved by plugging the refrigerator to a correct power source.

To install the temperature chart P-2415-C, write the date of shipment on date box. Place chart on center pin gently (DO NOT push firmly). Align chart day and time with white mark --- on front panel. Close door and lock fasteners 1/4 turn clockwise.

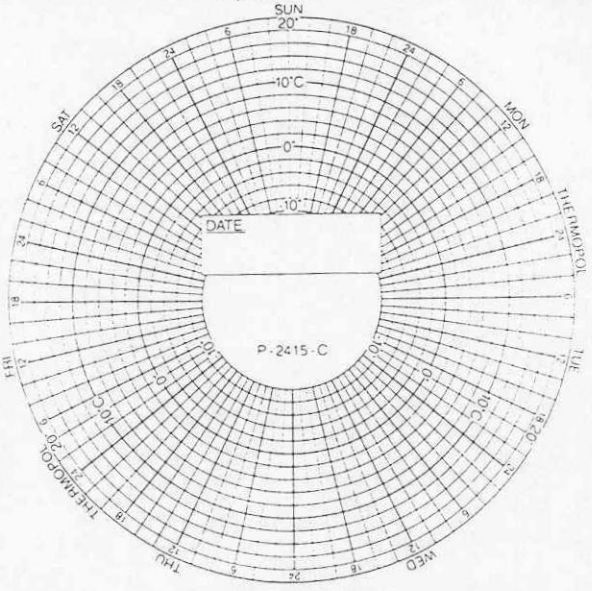

Figure 6 TEMPERATURE CHART

SECTION 5
CARE AND MAINTENANCE

5-0. General

Since the M-30TR is a Solid State device, it is virtually maintenance free, and there is only one preventive maintenance task to perform:

KEEP THE UNIT CLEAN

The inside compartment should be cleaned at the user's discretion. Ordinary soap and water are generally sufficient for cleaning the compartment. For extra soiled areas, stronger safe household detergents may be used.

To insure continued efficient cooling performance of the unit, the Thermoelectric Assemblies, located in the four corners of the unit, See Page 6 Figure 2, should be cleaned at one-year intervals. Use an air hose to blow any accumulated dirt and debris from the heat sink fins.

Note: Cleaning materials are not provided with the unit

5-1. Replacement Assemblies

Power Supply Assembly	A-7160
Battery Pack Assembly	A-2321
Power Cable Assembly	A-2089
Recorder Charts	P-2415-C
Wire Basket Assembly	A-2420
Thermoelectric Assembly	A-2436
Thermoelectric/Sensor Assembly	A-7437
Temperature Probe Assembly	A-7223
Front Control Panel Assembly	A-7211
Control Board Assembly	A-7205
Operational Manual	M-30TR-OM1
Maintenance Manual	M-30TR-MM1

SECTION 6
STORAGE

6-0. General

The M-30TR may be stored in a normally vented storage facility. Storage temperature of -40°C (-40°F) to 71°C (160°F) is acceptable.

SHORT TERM:
Clean the units load compartment with a mild detergent. Store power cable, power supply, and battery pack inside the clean load compartment.

LONG TERM:
Same as above. In addition, clean outside of unit by blowing an air stream over the unit. Blow dust and dirt from the 4 Heat Sinks located in the 4 corners of the unit, (Page 6 Figure 2). Place in a carton or cover with a plastic bag. Place in sheltered area.